Menlo Park Notebook #235 [N-81-09-03]

This notebook covers the period September-October 1881. All of the entries are by Francis Jehl. The book contains notes, calculations, and drawings relating to various electrical tests. Included are tests of meters, dynamos, cable insulation, batteries, wire conductivity, and fuses. There are two labels on the front cover marked "General" and "Francis Jehl." The book contains 280 numbered pages.

Blank pages not filmed: 50-257, 262-280.

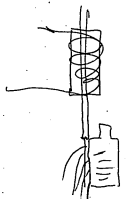
LIBRARY OF THE

BOARD OF PATENT CONTROL,

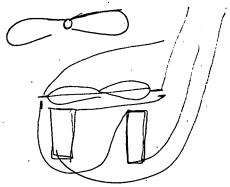
120 BROADWAY, NEW YORK.

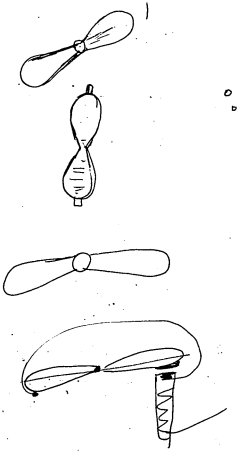
Firm & Dean
GENERAL ELECTRIC.
44 Broad St. NY.
May 1, 1896

Sept 8 1881 1



by suction it opens orifices which lets mercury out according to the strength of the current.





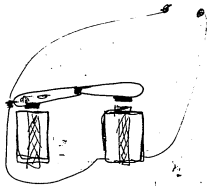
.355 ohms Temp F° 84. 60 ft

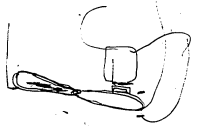
No 20 60 ft . 545 ohms

7½

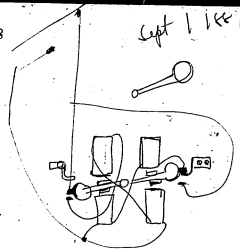
170.6 / 100 (.00

1706) 10.000 (.00586 / 1 ft
9530
17700
13644
10520
10236
60
•35 / 60
1051 6
1 09 60.
1 06 00
3560
368

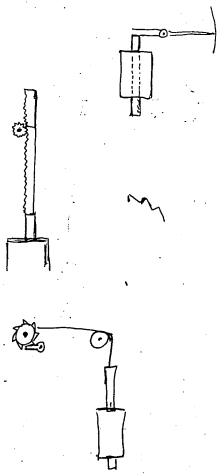




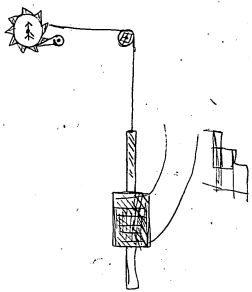
8



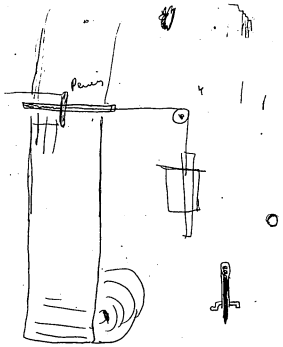
9



10



11



Sept. 8

Since Measured resistance of
two ~~Tangent~~ Galvanometers

Large one two coils
Coil No 1- 2,05 Ohms
Coil No 2- 2 0 3. 1 "

Small one - One coil 18.19 Ohms

Measured resistance of
heavy 15 inch horseshoe electro
magnet = .195 Ohms

Experiment to equalize deflection of Dynamometer Sept 8/87

20 Cells Standard Battery

Right Deflection 134
Left " 126
Difference 8 on R +

Taking off one coil of wire from front helix

R. Defl. 133
L Defl. 126
Dif 4 on R +

Taking off three coils from same helix

R. Defl. 135
L Defl. 128
Dif. 4 on R +

Four coils off from same helix

R. Defl. 136
L Defl. 130
Dif 6 on R +

over

Taking off six coils, assembly

R. Deflᵃ — 136
L Deflᵃ — 130
Def — 6 on R+

After altering top tension

R. Deflᵃ — 143
L Deflᵃ — 133
Def — 10 on R+

Again altering top tension

R. Deflᵃ — 130
L Deflᵃ — 130
Def — — 0

Again without further change

R. D — — 130
L. D — — 130
Def. 0

over

Again without further change
after a lapse of 15 minutes

R Defl^{n} —— 133
L Defl^{n} —— 131
Diff —— 2 on R +

Sept 9th 87 Continued same Subject
Without altering Inst

R. Defl —— 132
L Defl —— 133
Diff —— 1 on L +

Altering Lft Version

R. Defl —— 144
L Defl —— 135
Diff —— 9 on R +

Again altering Lft Version

R. Defl —— 134
L Defl —— 130
Diff —— 4 on R +

over

20 Again altering tension

R Defl 125
L Defl 124
Diff 2 on L +

Altering tension

R. D. 124
L. D 125
Diff 2 on R +

Altering tension

R. D 125
L D 125
Diff - 0

Again, 10 minutes after, without any alteration

RD 126
LD 124
Diff 2 on R +

after slightly adjusting Inst 21

R. D 123
L. D 125
Diff 2 on L +

again adjusting

R. D. 123
L. D. 124
Diff. 3 on R +

adjusting again
1 Hour after last reading

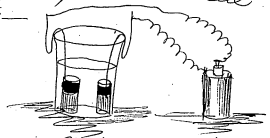
RD 122
LD 120
Deff 2 on R +

Taking off one more coil of wire from front helix making a all Seven coils unwound

RD 122
L D 120
Diff 2 on R +

Sep 9th / 881

Made Mercury deposition cell thus:—



put 500 Grams Mercury in each cup. Connected with 1 Cell Callod Battery 5.45 P.M.

~~This PM~~

Used concentrated solution of Hg. Nitrate, but found that the Positive cup became covered with crystals of nitrate through reduction of solution — I therefore have added about ¼ part of water

7.45 P.M I find that there still a small quantity of Mn. Ht being reduced on the surface of metal in positive cup so have added more water — the proportion is now about ⅔ sat. solution & ⅓ water

10 P.M. Weighed Mercury in Positive Cup & found that it had increased in weight by 4.4 Grs. (Equiv. Qty.) Mercury in Negative Cup weighs 489.4 Grs. shewing loss of 10.8 Grs. in grams but 5.6 Grs. lost & probably being caustic and converted into nitrate —

Time of operation 4¼ Hours

10.45 P.M. I repeat the foregoing experiment using as before 500 Grams Mercury in each cup, but making the solution of half water & half saturated Sol. cells of Callod Battery connected in Multiples arc —

See P. 26

Experiments with Dynamometer

Continued from Page 21 —

Put on Dynamo current with 2400 ohm Resist. in circuit which gave as follows

R. D —— 380
I. D —— 424
Diff .44 on R+

Adjusting zero point: —

R. D —— 395
I. D —— 365
Diff .30 on R+

R. D —— 402
I. D —— 388
Diff .14 on R. +

Sept 10/81 — 8.30 AM —

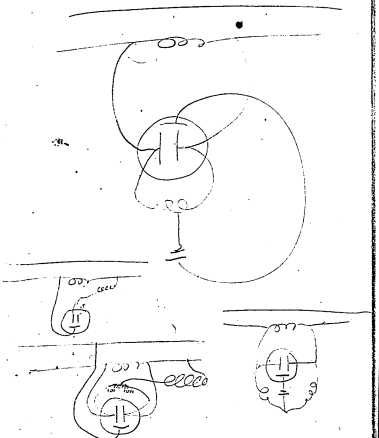
The result of last nights experiment shows a deposit of .9 Gr Mercury in ~~positive~~ negative cup, the Contents of which weigh 500.9 Grs. and a loss of 3.3 Grs in positive cup which weighs 496.7 Grs. — This time there have been no crystals of nitrate reduced on the surface of metal but the quantity of metal deposited appears too small —

12 Noon Saturday

~~Sept~~ — Repeat last nights experiment under like conditions in every particular

Sept 11th Sunday 3 P.M.

On weighing contents of cups Found that neg. Cup has gained 4.2 Grs and Positive Cup has lost. 6.2 Grs — Slight crystalization of Nit. on Mercury in Pos. Cup — Time of this experiment — 27 Hours —



Sept 11/81. — 3.30 PM. I repeat the experiment of immersing deposition under same conditions as heretofore

Sept. 15/81.

I immersed in water a coil of insulated cable leaving ends dry.

Sept 22

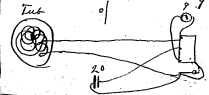
Measured above with Bridge & Thompson Galv. Measured about [redacted] 11600 Ohms, Ground to gas pipe.

Sept 27

Measured above as before with Thompson H. igh rest. galv. 20 cells standard Battery using the Bridge. On the first case took measurements leaving key open mostly. This time kept circuit closed. measurements gave.—

2190 Ohms
3890
4800
5500
5000 after 30 minutes

Each measurement being higher than preceding



90
20

~~100~~

20 : 70 :: x : 100
90 100

90) 2000 (22
10/60
6

The coil being connected with the galv and no shunting gave a deflection too wide for the scale.

Sept. 29
1540 Ohms
1532

Removing about 4 feet at one end from the water
1750 Ohms
1730 with a less length
1730 " " "
1740 " " "

Dividing the cable into numbered portions and measuring different lengths successively by adding on to the parts in the tub each succeeding part

Div 1 = 450000 Ohms
2 parts 20500
3 " 1430
4 " 1485
5 " 1585
6 " 1643
Wire changed to gas pipe ground
6 " 1667
7 " 1690
8 " 1730
9 " 1730
10 " 1750
11 " 1540 The whole

.32456 3
19.47360 2
1168.41600 3

.015) 1168.41600 (5

1168.4

) 1168.4

1168.4
.010 4
5840 3
1168
17.5.20

Experiment on the Conductivity of Sulphate of Zinc at different Temperatures
Sept 15 1881

at 43°	1.18 ohms
50	1.75
53	1.63
60	1.56
65	1.40
70	1.28
76.5	1.15
82	1.07
93	93

Sept 27

Took about 30 feet each wire
No 10 copper "Zinc white" cotton braided
" " "Paraffine" " "

To test under water the relative insulation.

"Zinc White"

Coil put into a basin of water
One end connected to bridge and
a small coil of uninsulated
wire in the same dish for
the other terminal

650 00
105 00
8200 Ohms
7000
1500 = 2 hours rate

"Paraffine"

After being in water nearly two
hours showed

1000000 Ohms

Sept 28

Paraffine

110000 Ohms
180000

"Zinc white"

570 Ohms

36

Sept. 27-81

Measured large coil fine F. S. wire

150 000 Ohms

15 000 "

37

Oct 7 1881

I short circuited the secondary battery on 1/4 ohm and obtained the deflection on the thompson high resistance galvanometer commenced at 10,40 A. M.

10,40 = 262 = 1,77 volt

10,41 = 261

10,42 = 260½

10,43 = 260

10,44 = 259

10,45 = 258½

10,46 = 257

10,47 = 256

10,48 = 254

10,49 = 252

10,50 = 249

10,51 = 245

Oct 7 1881

10,52 = 243½
10,53 = 243
10,54 = 242
10,55 = 241½
10,56 = 240
10,57 = 239½
10,58 = 239
10,59 = 238
11,00 = 237
11.01 = 236
11.02 = 235
11.03 = 234
11.04 = 232
11.05 = 229
11.06 = 225
11.07 = 219
11.08 = 212
11.09 = 194
11.10 = 188

Oct 7 1881

11.11 = 185
11.12 = 184
11.13 = 182
11.14 = 180
11.15 = 178
11.16 = 176
11.17 = 173
11.18 = 170
11.19 = 166
11.20 = 160
11.21 = 153
11.22 = 147
11.23 = 140
11.24 = 137
11.25 = 132
11.26 = 125
11.27 = 107
11.28 = 101.

Oct 7th 1881

11.29 = 98
11.30 = 93
11.31 = 91
11.32 = 88
11.33 = 83
11.34 = 81
11.35 = 78
11.36 = 77
11.37 = 77
11.38 = 75
11.39 = 73
11.40 = 71
11.41 = 68
11.42 = 67
11.43 = 64
11.44 = 62
11.45 = 60

Oct 7 1881

11.46 = 59
11.47 = 58
11.48 = 57
11.49 = 56
11.50 = 55
11.51 = 54
11.52 = 52
11.53 = 51
11.54 = 50
11.55 = 50
11.56 = 50
11.57 = 49
11.58 = 48
11.59 = 48
12.00 = 47

Oct 7th 1881

1201 = 47
1202 = 47
1203 = 47
1204 = 46
1205 = 46
1206 = 46
1207 = 46
1208 = 45
1209 = 44
1210 = 44
1211 = 44
1212 = 44
1213 = 44
1214 = 44
1215 = 44
1216 = 44
1218 = 43
1220 = 42

Oct 7th 1881

1222 = 41
1224 = 41
1226 = 41
1228 = 41
1230 = 40
1232 = 39
1234 = 38
1236 = 43
1238 = 43
1240 = 41
1246 = 39
1250 = 37
1255 = 37
~~1260 =~~
1100 = 39
1105 = 41
1110 = 38
1115 = 38
1120 = 37

Oct 7 1881

125 = 35
130 = 35
135 = 42
140 = 39
145 = 39
150 = 37
155 = 36
200 = 35
210 = 33
220 = 34
230 = 37
240 = 35
250 = 33
~~260~~ =
300 = 36

Oct 7 1881

Ord standard cell gave a deflection of 1.59

The resistance of the box used was .34 ohms

Oct 10. 1881

Tested thiamo battry made up of plates of ~~Copper~~ Carbon and plated with a copper deposit

9. plates gave a deflection of 12 degrees on high resistance galvanometer

John F. Ott.

Oct. 19. 1881

Tested pedilom Meter and found the ball to light to work the lower magnism and the presure magnets want as many springs as lights ar carculated to be put on

John F. Ott.

Oct 26. 1881

Resistence of deposit of plates

1. Ohm and 1/100 Temperature 19 Cen. distance apart 125/1000

10-25-81

Conductivity of lead mine.

Safety catches number 1, 2, & 3, mine

1 has in the plug .046 lead mine

2 " " " .040 "

3 " " " .032 "

Bergman says

1 will carry 20 lamps

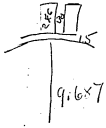
2 " " 12 "

3 " " 6 or 8 "

~~Every lamp probably~~

147 bars

Diameter of bobbin 9.687 inches
Height of bar .246 "
Insulation between bars .030 "
Insulation between surface of iron bobbin & bottom of Copper rods .015



diameter of iron bobbin

Height of bar .246 X 2 =	9.687
Insulation bet iron & copper bar .015 X 2 =	0.492
	.030
	10.209

diameter of iron bobbin with copper bars also including insulation between surface of iron bobbin and bar

10.209 inches

This multiply by 3.1415926 equals circumference on the outside.

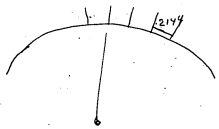
10.209 X 3.1415926 =

32.072518853 4 inches

32.072518853 4 / 142 = .2258

.2258
.0300
.1958 bar width of cup

$$
\begin{array}{r}
.2149 \\
142\overline{)30.526855294} \\
284 \\
\hline
212 \\
142 \\
\hline
706 \\
568 \\
\hline
1858 \\
1278
\end{array}
$$



diameter of iron bobbin

Insulation between iron & copper $\begin{array}{r} 9.687 \\ .030 \end{array}$

9.717

circumference on the lip of insulation.

$9.717 \times 3.1415926 =$

30.526855294 inches

This divided by 142 gives the length of each space at the bottom

$\begin{array}{r} .2149 \text{ inches} \\ .0300 \end{array}$

$.1849$ width of bar at the bottom.

$.1849$ inches